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ABSTRACT

When critical thinking is conceptualized as mindful learning, the focus is on the educational experiences or actual academic tasks designed to engage students in active learning. Academic tasks are sets of specifications for learning activities that provide the framework for curricular content. The academic tasks are designed by teachers and shared with students, or designed by teachers and students together. Academic tasks differ from conventional curriculum guides that focus on subject matter scope and sequence. They also differ from conventional behavioral objectives in that academic tasks focus on the work of the student rather than on the results of teacher work. When academic tasks are associated with critical thinking, students have opportunities for critical thinking as part of the learning experience itself. Conventional conceptions of academic tasks include routine or recall tasks, opinion, formal, and skilled performance tasks. Tasks and subtasks that incorporate critical thinking as a mindful learning concept include strategic, probablistic reasoning, creative, and collaborative tasks or subtasks. Mindful learning tasks involve higher degrees of ambiguity, or uncertainty, and higher degrees of perceived risk than most conventional academic tasks. Conceptualizing critical thinking as mindful learning involves fundamental changes in the role of the teacher and in the student-teacher relationship. (IAH)

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Critical Thinking as Mindful Learning

Wendy Oxman-Michelli

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Montclair State
Institute for Critical Thinking

Resource Publication Series
1991

The Institute for Critical Thinking at Montclair State is designed to support and enrich faculty development efforts toward critical thinking as an educational goal. Working closely with faculty from Montclair State and colleagues from campuses around the world, its primary purpose is to serve as a catalyst in the development of educational excellence across the curriculum at Montclair State. A collaborative, multi-disciplinary approach is in process, with attention to the study of both the theoretical aspects of critical thinking across the disciplines and their implications for teaching and learning at the college level. In addition, the Institute reaches out to colleges and schools, helping them to incorporate critical thinking into their curricular plans.

As part of this effort, the Institute for Critical Thinking publishes a newsletter, *Inquiry: Critical Thinking Across the Disciplines* on a monthly basis during the academic year. The newsletter includes information about the activities of the Institute as well as short papers on topics relevant to critical thinking. The Institute also publishes an ongoing series of Resource Publications. These documents make available, to interested faculty and others at Montclair and elsewhere, working papers related to critical thinking as an educational goal, offering extensive discussions of the kinds of issues that are presented in summary form in the newsletter. Resource publications are regarded as works-in-progress: articles written as tentative arguments inviting response from others, articles awaiting the long publication delay in journals, etc.

Proceedings of our annual conferences are also published by the Institute. To date the following proceedings have been published and are available at cost:

Critical Thinking: Language and Inquiry Across the Disciplines, Conference 1988 Proceedings
Critical Thinking: Focus on Social and Cultural Inquiry, Conference 1989 Proceedings.

In addition, the proceedings of more recent conferences will soon be available. In preparation are:

Critical Thinking: Focus on Science and Technology, Conference 1990 Proceedings
Critical Thinking: Implications for Teaching and Teachers, Conference 1991 Proceedings

In this fourth series of resource publications, we have again included working papers by members and guests of our Institute Fellows' "Round Table." Many of these working papers have been presented for discussion at one or more of the Fellows' seminar meetings, and have influenced our thinking about the nature of critical thinking as an educational goal. We have also included papers dealing with practical applications of the Institute's work and of related projects in other settings.

The Institute welcomes suggestions for our Resource Publication series, as well as for our other publications and activities. Correspondence may be addressed to the Editors:

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CRITICAL THINKING AS MINDFUL LEARNING

Wendy Oxman-Michelli

In this approach to critical thinking, the focus of attention is on the actual academic tasks designed to engage students in the school "work" of active learning. During academic tasks involving critical thinking, students' attention is directed toward making sense of the learning experiences themselves. Teachers recognize, assume and identify for students the responsibility for the judgments they make on their behalf at the start of the academic task, gradually and collaboratively shifting this responsibility to them as they work through the task.

Mindful learning and academic "work"

Teachers are often frustrated by questions from students like "Is that going to be on the test?" or "Do we really have to know that?" or "How long do you want the paper?" These questions are really not surprising; they represent attempts to determine the nature of the academic task assigned; the scope of the academic "work" (Doyle, 1983; 1986) in which they are to engage. Questions like that reflect students' concerns about:

-What is it that I have to do? What am I responsible for?
-How am I supposed to do it? What can I use? What can't I use?
-What criteria will be used to judge what I've done?

Everyone, required to do something, mentally organizes what has to be done in these terms – in terms of one's responsibilities, and how the outcome of one's work will be judged. Teachers, in fact, when they're thinking about their own teaching "work," think primarily in terms of these same questions. When they think about what students have to *learn*, however, they typically think mainly in terms of the content of their own course outline, curriculum guide, syllabus or text, to be shared with the student.

In the conception of critical thinking as mindful learning, it is assumed that educational experiences are conceptualized by students as school "work" – that is, in terms of the academic tasks or academic work they are required to do. Using a "work" metaphor does not imply an analogy to a factory model of schooling. The common reference to a factory model of schooling suggests that students are seen, not even as assembly line workers themselves, but as raw material to be worked on by the teachers who "deliver" educational services to the students as they proceed through the

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Note: *This Resource Publication presents a revised and expanded version of an article previously published in* Inquiry: Critical Thinking Across the Disciplines *(Volume 3 No. 4, May, 1989). It is also a preliminary version of a chapter to be published in* The Many Faces of Critical Thinking, *a compilation of a variety of approaches to conceptualizing critical thinking as an educational goal. A list of tentative chapter headings can be found in the Appendix. Comments and suggestions on this working paper will be especially welcome!*

schooling process. Here, teaching is seen not as "delivering" education through talking, but as engaging students in active, productive academic work; as helping them, "coaching" them, toward taking responsibility for making academic learning experiences meaningful; toward self-directed learning. Education is what students do for themselves, not what teachers talk about.

Critical thinking and academic tasks

Academic tasks provide the framework within which students encounter curricular subject matter. A conception of the curriculum in terms of academic tasks that students are to complete, and a conception of the role of the teacher as "coach" makes possible a focus on critical thinking as mindful learning. Among the many different types of academic tasks at all levels of education are those that are explicitly designed to make academic work mindful. In this approach, students are helped to relate the new academic content to what they already know, and the processes involved in the task to what they already know how to do.

Academic tasks are sets of specifications for learning activities, designed by teachers and shared with students, or designed by teachers and students together. They include the goals to be achieved by the student, the strategies students are to use to attain the goals, the resources available, and the ways in which goal achievement is to be determined. They serve to integrate subject matter content with objectives of instruction that include skills, attitudes and values as well as knowledge.

Academic tasks differ from curriculum guides, syllabi, or content outlines that focus on the scope and sequence of subject matter organization, although their design must incorporate these considerations. They differ from objectives stated as intended behavioral outcomes of instruction in that their focus is on the work students must do in order to accomplish the task, rather than what students will be able to do as a result of the teacher's efforts. Individual or group, extended or brief, carefully planned or "opportunistic" (Jackson, 1990), academic tasks can be constructed for mindful learning.

Wang & Palincsar (1989), in discussing their model of instruction lesigned to teach students to assume an active role in their learning, see the school curriculum as consisting "of the problems represented in subject-matter content and the cognitive strategies (problem solving approaches) that facilitate solutions." In this sense, a focus on self-directed learning, on making sense of academic work, becomes the "heart of the curriculum" (p. 77).

In order for students to learn to think critically, meaningful ac. demic tasks must be designed in such a way that critical thinking is required. Smith (1990), notes:

> *There is a close and sometimes unrecognized relationship between intentional, mindful learning – and critical thinking; the goals of learning and those of critical thinking are very much alike. We do not draw an inference and then learn; we learn as we draw the inference. We do not reach a conclusion and then learn the conclusion that we have reached; the learning and the conclusion occur together. To solve a problem is to learn to solve the problem* (p. 42).

A critical thinking academic task provides students with opportunities for critical thinking as a part of the learning experience itself. Such a task is planned in advance, is typically complex and extended in time, has many components and multiple objectives, and contains elements of intrinsic interest or choice. Since it is time consuming, it is most appropriately based on one or more pivotal concepts in a field of study. A pivotal concept is one that is important in its own right within the subject matter to be learned, with important connections to other central concepts. Critical thinking academic tasks often, but not always, take the form of an issue or problem to be resolved; often, but not always, they involve students in interaction with each other.

This conception of critical thinking requires careful consideration and review of the academic subject matter of the curriculum, to distinguish between what would best be learned through critical thinking, and what would more appropriately be learned through other kinds of academic tasks. Choices among many possible issues, problems, and concerns within units of academic subject matter must be made to determine those that best lend themselves to critical thinking. Further choices must be made among subordinate subject matter concepts, skills, and principles, to determine which must be considered prerequisite to the critical thinking task, and which can be learned during the course of completing the critical thinking task. Plans must be made to develop academic tasks through which students can most efficiently learn the prerequisites, and tasks through which students can most effectively learn by thinking critically. Within the classroom, the teacher builds and reinforces students' conceptions of the classroom as a place where learning is supposed to make sense. Students are taught to regard the classroom as a place where thoughtful choices and responsible judgments are made, where questions about how and why learning activities are undertaken are asked and answered.

Conventional conceptions of academic work

The conventional, or "normal" understanding of education involves the assumption that the student's work is to "learn" – defined as "to remember," or "recall" what the teacher and the textbook author has said. Thus, in the absence of information about the task to the contrary, students assume the following answers to the questions:

Q-What is it that I have to do? What am I responsible for?
A. Remember what the teacher and the textbook say.

Q-How am I supposed to do it?
A. By listening to the teacher and taking notes; by reading and reviewing text and notes.

Q- What can I use? A. Notes and text.
Q- What can't I use? A. Other students' work.

Q-What criteria will be used to judge what I've done?
A. Fidelity to the teacher and textbook's material.

Another conventional academic task is a "routine" task, in which students must complete a series of exercises, typically presented in workbook or worksheet format. These exercises engage students in academic work that is very familiar, even stylized, and assigned presumably for practice or reinforcement of previously acquired skills.

These conventional conceptions of academic tasks such as recall and routine tasks may interfere with students' ability to engage in academic tasks of different kinds, including those requiring critical thinking. For all students, in the absence of clear task directions to the contrary, the conventional conceptualization is assumed to apply. For some students, the convention applies even when clear task directions are given for an alternative type of task. Some students try to complete all tasks as if they were memory or routine tasks, even when given a different set of instructions.

Understanding the conventional conceptualizations of academic tasks, such as tasks involving either direct recall or memorization, or the direct application of known routines, is important in understanding problems that some students have in adapting to non-conventional academic task demands. Students in a classroom in which conventional tasks have historically been used exclusively might well respond anxiously, if not negatively, to a newly introduced non-conventional task.

Intellectual demands of academic tasks

Student expectations for the way the products generated as a result of engaging in an academic task will be evaluated affect the way in which a task is approached. Despite the fact that academic tasks vary in their intellectual demands and require different strategies for getting them done, students often focus on "what does the teacher want?" or "how will my work be judged?" For instance, students expecting to be evaluated on their ability to memorize a list of concepts, definitions, and simple associations do different

work than students who expect to have to explain why one of the concepts on the list is applicable in a given situation and not in another, or students who expect to have to generate principles for organizing and applying that same set of concepts. Students who know that they will be evaluated on their ability to use a routine procedure have different work to do than those who know they will have to explain why the procedure works – or why it does not, or decide when – and when not – to use it. In the absence of specific information to the contrary, students at all levels of instruction expect academic tasks to require simple recall or the application of known procedures as routines or as skillful performance, and attend to those features of a new task that fit these expectations.

Learning the principles that underlie how and why a procedure works uses different cognitive operations than applying a known procedure to familiar material. Textual or teacher-presented content is processed differently by students whose purpose is to memorize details, as compared with students whose purpose is to integrate the underlying conceptual meanings with other, previously learned information. Processing to accomplish one type of task is often incompatible with, and may in fact interfere with, processing to accomplish another. (Try proofreading and reading for understanding simultaneously).

Types of academic tasks

Doyle's conceptualization of differences among different types of tasks include the following types of academic tasks:

1. ***Routine or recall tasks.*** These tasks require the application of well-known procedures in familiar contexts. There are no judgments to be made. Routine or recall tasks extend to an academic setting many of the kinds of contextual learning tasks that children have engaged in since birth. These tasks are most useful for acquiring the large body of early childhood academic content for which critical thinking would be inappropriate, such as in learning conventional rules and concepts (names of people, places, and things; rules of social behavior, melodies and lyrics of songs; seasons and holidays; color, shape and size, rules of sound-symbol correspondences and spelling in English, arithmetic computation, etc.). They are also inherent components of all other tasks; as prerequisites and correlates of mindful learning and skilled performance tasks.
2. ***Opinion tasks*** require the expression of a personal preference in situations in which there is ambiguity; there is no single right answer. Opinion tasks call for judgments, although not for reasoned, or supported judgments. Students know how to express opinions; infants express opinions (try feeding a baby spinach when she is expecting peaches, and watch her expression!), but the expression of opinion by young children is not universally acknowledged and rewarded by family members or teachers. Students are sometimes asked to express opinions in school, but the expression of opinion is

not often considered as an academic task or part of an academic task, in part because teachers and curriculum planners consider them somewhat subjective, "frivolous," and difficult to assess. However, opinion tasks are components of strategic, probabilistic, and creative tasks. They are appropriate in helping students to develop interests, self-esteem, and perspectives on issues. Many students need encouragement to formulate and express their opinions and preferences; some need help in recognizing and respecting the opinions and preferences of others.

In addition to recall and routine tasks, and opinion tasks, Perkins (1990) identifies:

3. ***Formal tasks*** in which a single path to solution of a well-defined, but difficult problem, must be found, as in the completion of a complex mathematical problem, and

4. ***Skilled performance tasks,*** which require high levels of skill for the challenge of a "one-shot" performance as in such areas as sports, musical performance, or oral recitation. Academic tasks that involve "heavy content loads," such as preparing for an academic test (Doyle, 1983), bear the characteristics of skilled performance problems.

In contrast to recall and routine, formal, and skilled performance tasks are tasks that involve critical thinking as mindful learning.

5. ***Mindful learning/ critical thinking tasks.*** There are many different kinds of tasks that can engage a student in mindful learning. These are all critical thinking tasks in which the student encounters work requirements that require the making of reasoned judgments. He or she must engage in active learning not only in order to make judgments about the nature of the task, but to make judgments about how best to accomplish it, and make judgments about time and resource management as s/he proceeds on toward a goal. Optimally, a mindful learning task is well-matched to the learning needs of a student; that is, its difficulty level is set just beyond his or her current knowledge and abilities. Resources, including incentives and support from others, however, are available. Mindful learning tasks require intellectual effort on the part of the student. According to Doyle, such tasks, which he calls comprehension tasks, involve a) chosing procedures applicable to a particular problem from among several procedures; b) applying known procedures to a new kind of problem; c) recognizing or generating transformed versions of known information; and d) drawing inferences from known information or procedures. Any or all of these operations might be required in a given mindful learning task.

Mindful learning tasks, all of which are, in this conception, critical thinking tasks, involve the following types, suggested, in part, by Perkins' (1990) analysis of problem types:

> ***strategic tasks or subtasks,*** which are characterized by the challenge to explore and choose among alternative sets or sequences of potentially appropriate procedures, or strategies. In strategic tasks, the goal, or outcome is known in advance, but there are many potential avenues for success. Judgments are needed at the outset, as well as when subgoals are reached, as to which subsequent strategy is likely to have the most favorable outcome. The task of writing an essay engages the student in a strategic task.
>
> ***probabilistic reasoning tasks or subtasks,*** in which the challenge is to reason in situations involving complex outcomes and/or multiple values. The value of each potential judgment that might be made must be considered relative to complex goals. There are multiple criteria according to which the judgments must be made, which may conflict with each other. There is needed information that is partially unknown and may well remain so. Many real life judgments involving complex issues are of this nature.
>
> ***creative tasks or subtasks,*** in which the challenge is to shape an open opportunity through inventiveness. Creative tasks involve finding and defining goals as well as strategies. Judgments are made throughout this process.
>
> ***collaborative tasks or subtasks,*** characterized by the challenges of compromise, consensus, and mutual assistance. As interpersonal tasks, they necessarily involve the resolution of multiple perspectives during the process of making judgments.

Mindful learning and ambiguity

Doyle (1983) classified various types of academic tasks in terms of ambiguity. Different types of tasks involve different inherent degrees of ambiguity, or uncertainty, with mindful learning tasks highest in ambiguity. Ambiguity, according to Doyle,

> *refers to the extent to which a precise answer can be defined in advance or a precise formula for generating an answer is available. Such ambiguity does not result from poor explanations by a teacher. Rather, it is an inherent feature of academic work* (p. 183).

Expanded to incorporate the problem types suggested by Perkins, the types of academic tasks outlined by Doyle are presented in Figure 1. Mindful learning tasks all involve some degree of ambiguity.

Figure 1

Types of Academic Tasks

	High Ambiguity
Routine; Recall/ Memory	***No***
Opinion	***Yes***
Formal	***No***
Skilled Performance	***No***
Mindful Learning	
Strategy	***Yes***
Probabilistic Reasoning	***Yes***
Creative	***Yes***
Collaborative	***Yes***

Opinion tasks and mindful learning tasks inherently involve ambiguity, while recall, routine, formal, and skilled performance tasks do not.

Mindful learning tasks are critical thinking tasks. These tasks involve students in activities embedded within content instruction. In such tasks, there are inherent ambiguities to be addressed, uncertainties to be resolved, and judgments to be made. The tasks themselves require transformation rather than recall of subject matter information. They may require that the student make judgments in selecting and ordering strategies best suited to complete a particular task from among several that are potentially appropriate. They may require that students draw inferences, and they may require that the student discover, as well as address, new kinds of opportunities. They may require that students collaboratively resolve an issue or come to consensus.

Typically, a critical thinking task is complex and takes the form of an extended individual or group assignment, and contains multiple objectives and components. To provide for student differences in interests and abilities, critical thinking tasks often provide the opportunity for choice and/or student interaction. Since such tasks are time consuming, they are usually based on one or more pivotal concepts in a particular field of study. They often, but not always, take the form of an issue to be resolved, a problem to be solved or a product to be created.

Mindful learning and metacognition

An important aspect of a conception of critical thinking as mindful learning is that of the teacher's self conscious awareness of his/her responsibilities as coach, in addition to knowledge of the students' current abilities, needs, expectancies, and individual differences, and the subject matter focus of the learning experience. The students' self-conscious awareness of the nature of the task to be completed, the kinds of "work" required, and how their work will be evaluated, is also important. This self-conscious awareness is referred to as "metacognition," or "metacognitive knowledge."

In this approach, the expectancies students bring with them to an academic task are made explicit as metacognitive knowledge; the extent to which the academic task is congruent or incongruent with the expectations of a student is relevant to making sense of the academic task itself. Students are taught, explicitly, the characteristics and demands of a variety of academic tasks. With regard to each type of task, they are taught to attend to the knowledge and skill required by the task itself, to recognize when they need information or skill that they do not have, and, gradually, to know how and where to acquire it on their own. Both teachers and students address directly the discrepancies between what is already known and what is to be learned, the work that must be done to reduce the discrepancies, and the reasons why the tasks are assigned by the teacher to assure that the work the student does achieves the desired results.

Metacognitive knowledge of the characteristics of critical thinking tasks in contrast to other kinds of academic tasks, may play a central role in transfer from one area of study to another.

Mindful learning and teaching

Starting to teach for critical thinking involves overcoming the widespread notions that comprise students' expectations regarding forthcoming school experiences, and places a teacher, typically, in an awkward position. Most students come to situations involving academic tasks with previously established habits and expectancies that interfere with critical thinking.

When a teacher assigns students a task requiring the application of critical thinking skills, with its inherent ambiguity, it is often not apparent to students that the ambiguity lies in the nature of the task rather than in the lack of clarity (and therefore poor teaching) on the part of the instructor. Worse yet, they may consider such a task as "unfair;" that is, in violation of their expectations for the educational process, or of the implicit contract negotiated between teachers and students, as described by Apple(1975). Students come to school expecting to a) pay attention, and then b) to "know," and "tell" the answers to questions they are asked. Students expect that they will either know or not know the answer; they rarely think in terms of "figuring out one or more possible answers and choosing among them," as in any complex task or other situation calling for reasoned judgment. They even more rarely think that "figuring out what the task actually is" would be part of the task itself. In addition, there is ordinarily an element of social risk involved in critical thinking, however conceptualized. Students often dislike being "wrong," "different," or unable to complete a task in a routine manner, and thus try to avoid such situations.

Mindful leaning and the social environment of the classroom

In an approach which conceptualizes critical thinking as mindful learning, attention to the nature of the educational environment is crucial. Academic tasks are embedded within the social as well as the intellectual environment of the classroom. Because of the complex demands of course design, classroom management and instruction, as well as the public nature of much academic work in classrooms, the elements of a task rarely function equitably for all students. For a task to function optimally, it must be set just beyond the student's current ability (Hunt, 1961). The task must also include incentives that engage the student mindfully in the task, resources so that the student can, in fact extend his/her ability, and an appropriate reward structure.

In actual classroom settings, students differ in their current abilities and background knowledge, so that a "well-matched" task for one student may be a poor one for another. The social setting of the classroom also may change the task at hand. For example, resources (such as prompts given by a teacher to a student needing special encouragement to participate) may change an appropriately challenging critical thinking task to a routine one for an alert student. Access to teacher praise, often a desired incentive, may not be equally available to all students, who differ in the interpersonal skills necessary to elicit such rewards. The social setting may or may not permit students to consult with each other. The talents of advanced students, potentially available as resources for their peers, are often ignored as resources, and opportunities to reward these students for collaborative efforts are wasted. In some poorly managed classroom environments, fear of humiliation may be a stronger incentive to avoid participating than are the positive incentives for participating that are provided by the teacher.

Mindful learning and risk

In addition to describing different kinds of academic tasks in terms of relative degrees of ambiguity, Doyle (1983) classified them in terms of their relative degrees of risk. Risk refers to the public and evaluative context in which the tasks are accomplished. In academic settings, "risk" involves the possibility of failure, of embarrassment, of lowered self-esteem.

The amount of risk that a student perceives as inherent to a given academic task is partially related to the relative degree of familiarity, or expertise that that student has developed with regard to that type of academic task, as well as to the difficulty of the task. Recall and routine tasks, because they are easiest and the criteria for success most familiar, are regarded by students as bearing relatively little risk. Conscientious attention, rather than mindful intellectual struggle, should produce success. In opinion tasks, when it is clear that there will be no evaluative judgments, little risk is perceived.

Mindful learning tasks involve high degrees of risk, not so much because of difficulty but because they require intellectual effort in situations involving ambiguity, and therefore cannot be completed by attending conscientiously to known information or applying known procedures. Students unfamiliar with the characteristics of particular kinds of mindful learning tasks, who are novices with regard to the kind of work involved, are especially fearful of the possibility of failure, embarassment, and reduced self-esteem. Perceptions of risk increase over grade levels among students who have, over their school careers, engaged mainly in recall and routine tasks.

Risk is perceived for formal and skilled performance tasks, no matter how much familiarity and expertise has been developed, as they are inherently difficult and subject to stringent criteria of success. However, the lack of ambiguity inherent in such tasks lowers the perceived difficulty level of these tasks.

Figure 2 presents the relative degree of risk typically perceived by students for different types of academic tasks.

Figure 2

Risk and Ambiguity in Academic Tasks

	High Risk	High Ambiguity
Routine; Recall/ Memory	***No***	***No***
Opinion	***No***	***Yes***
Formal	***Yes***	***No***
Skilled Performance	***Yes***	***No***
Mindful Learning		
Strategy	***Yes***	***Yes***
Probabilistic Reasoning	***Yes***	***Yes***
Creative	***Yes***	***Yes***
Collaborative	***No***	***Yes***

Mindful learning and task difficulty

Mindful learning tasks are perceived as most difficult for students to accomplish, and most difficult for teachers to manage. In part, mindful learning tasks are considered difficult by students when they don't undertand the nature of a *particular* kind of task, misinterpret it as a recall, routine, opinion, formal, or skilled performance task, and become frustrated and anxious when it cannot be accomplished in familiar ways. Teachers who are insensitive to the apprehensions of students faced with such a task sometimes fail to provide sufficient orientation to the task so that the student correctly perceives its inherent ambiguities.

Doyle suggests that students invent strategies for minimizing risk and ambiguity, such as restricting output (not volunteering answers; writing answers that are as short and as non-committal as possible), delaying, pressing for increased amounts of information until the task is virtually done by the teacher, etc.

Students who expect all academic tasks to be recall, routine, formal, or skilled performance tasks may try, through these or other techniques, to "negotiate" with the teacher to reduce a critical thinking task to one involving less ambiguity and risk. They may try to "walk around" the assigned task, reinterpreting it, consciously or unconsciously, and completing work other than that which was intended.

Such students may attempt to minimize both ambiguity and risk by pressing the teacher for increasingly explicit instructions about the task and increasingly elaborate detail about the expected "product" (Carter and Doyle, 1982; Davis and McKnight,1976; Wilson,1976; Oxman and Barell, 1983), and tend to express dissatisfaction with the teacher's presumed lack of clarity. This consistent finding has implications for the interpretation of the "popularity" of teachers at all levels of education, including the popularity of instructors at the college level who are formally evaluated by students.

Mindful learning and collaboration

Collaborative, or cooperative learning tasks, which can be adapted for use at all levels of education and in all subject areas, foster critical thinking as mindful learning in a variety of ways. First, students help each other with their work; both peer "teachers" and "learners" can benefit from the time to think together about the task. When peer teaching becomes a natural part of the educative process, students become comfortable assuming either role at appropriate times. As teachers have always known, you learn subject matter when you have to teach it. The process of explaining something that has become second nature to you deepens your own understanding. Similarly, students who are good at something will improve even further by assuming a teaching role; because it requires that they slow down and reflect on the subject. Students who need help may feel more comfortable asking a classmate rather than the teacher; in classrooms structured to facilitate cooperative learning, peer assistance is more readily available when needed. Second, students who work together learn respect for each other, and learn how to work with others in ways that may transfer to later workplace situations involving teamwork.

Cooperative learning tasks also provide opportunities for reducing the sense of risk involved with the task itself, since both the task and the risk are shared with others. For some students, the fear of failing to contribute to the group effort often outweighs the fear of the task itself. The opportunities for reciprocal coaching assistance among students are also more likely to lead to success, decreasing the sense of risk in future tasks; two heads (or more) are often better than one. A number of reviews of

research on the effects of cooperative learning have been published (Slavin, 1989; Johnson et al. 1981; Davidson; 1985; Newmann & Thompson, 1987), although most research on cooperative learning focused on its effectiveness in improving lower level basic skills rather than higher order thinking. Slavin (1990) notes that "cooperative learning can be an effective means of increasing students achievement," (p. 53) but, at least at the elementary level, group goals and individual accountability must be incorporated into the structure of the collaborative learning task.

Mindful learning and evaluation

Driven by accountability, academic tasks are not taken seriously by students unless "products" of their work are required. Conventionally, the product the student must generate typically takes the form of an "answer" or series of answers which may be produced in oral or written form, in response to a teacher's question or presented in instructional materials. In critical thinking tasks, they may take this conventional form, but may well take some other form.

Academic tasks are directly related to the reward structure of a particular class. The products that a teacher *actually* accepts and rewards define the task for students, rather than the products that were part of the teacher's intentions. A teacher might present a task calling for mindful learning; if rote recall of a textbook passage is accepted as task accomplishment, the task is actually a recall task rather than one involving mindful learning. If a teacher rewards the production of unreasoned opinions when the task was intended to require students to produce reasoned judgments, the academic task that has been accomplished is that of generating unreasoned opinions.

Mindful learning and the role of the teacher

Because of the typical misunderstandings of the nature of mindful learning tasks, they are often viewed by both teachers and students as least satisfactory in terms of instructional efficiency and student cooperation. Thus, although planning often involves the intention of assigning such tasks, in practice, teachers tend to allow the tasks to change. Instead of preventing student from "walking around" the mindful learning task, they respond to student pressure for a reduction in ambiguity and risk. This response is justified in terms of efficiency of time and content coverage, and of maintaining students' cooperation, attention, and even good student ratings.

In order to teach for critical thinking, students must be taught explicitly the features of critical thinking learning tasks in general, including those of ambiguity and risk, and ways of managing them. The teacher must provide appropriate resources, support, incentives, and rewards for accomplishing such tasks as intended, while withstanding student pressure to change them. Most importantly, students must be evaluated on their accomplishment of these tasks, even when the results at first seem

discouraging and the students uncomfortable. In time, the students' conceptions of academic work will expand to accomodate this new type of task, and resistance will fade. They may also, over time, develop an appropriate set of expectations and dispositions with regard to these new demands. Teachers can encourage the development of appropriate dispositions by rewarding their expression when they occur during the completion of critical thinking tasks.

Conceptualizing critical thinking as mindful learning involves fundamental alterations in the role of the teacher, and thus in teacher-student relationships as well. The role of the teacher includes direct instruction, management, and coaching, with an emphasis on coaching, and with the general goal of maintaining the active engagement of students in critical thinking tasks. The teacher also shares his/her role with others, including students, although s/he maintains responsibility for it. This role contrasts strongly with the conventional conceptions of the role of the teacher.

Direct Instruction: The teacher, as instructor, provides timely and efficient information at the beginning of the task, to give information about the task, to review the characteristics of similar and different tasks, as well as to review or teach routine prerequisite knowledge and skills. Intermittently, direct instruction is given on an individual or group basis as needed throughout task, for information and review of task characteristics and routine prerequisite knowledge and skills where efficiency is appropriate.

Management: As manager, the teacher organizes resources (time, space, materials, other adults, students) to maximize their optimal use. As manager, the teacher provides structure for the group, in order to minimize confusion and wasted time, and maintain order.

Coaching: The teacher, as coach, provides models, incentives, encouragement, reward, clues and hints, suggestions, scaffolding and other indirect assistance throughout the task. As coach, the teacher provides support for students' efforts in active, mindful learning.

Critical thinking as mindful learning and curricular issues

This approach to critical thinking places heavy demands on the teacher, as well as those charged with overall curriculum and staff development responsibilities. The latter group includes publishers of textbooks and other curriculum materials, as well as school administrators and curriculum coordinators. Although talented, creative, experienced teachers can and do engage students in critical thinking academic tasks without support, the demands of creating and implementing such tasks call for more appropriate curriculum materials, improved professional development efforts, administrative and collegial support, and oppportunities for collaborative planning.

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